

REMARKS

Claims 1-8 are all the claims pending in the application. Applicant thanks the Examiner for indicating that claim 4 contains patentable subject matter.

The drawings filed October 6, 2000 are objected to; specifically, the drawings do not show a light output means. Applicant amends Figure 2 to include reference to the light output means. Additionally, Applicants amend the specification to correspond with this change.

Also, Applicants note that Formal Drawings were filed on December 6, 2000.

The specification has been reviewed for minor errors and has been corrected accordingly.

Claims 1-8 are rejected under 35 U.S.C. § 112, second paragraph.

In particular, the Examiner rejects claim 1 for using the term "information light". Applicant amends claim 1 to refer back to the light incident on the lower surface, which is first recited in the first paragraph of claim 1.

Also, the Examiner rejects claim 4 for using the term "smaller than". We would traverse this rejection. According to MPEP § 2173.05(b), terms of degree are not automatically indefinite, and the acceptability of the claim language depends on whether one of ordinary skill would understand what is claimed, in light of the specification. In this case, the term "smaller than" would be understood by one of ordinary skill in the art because the claim clearly defines the distance, of which the ends protrude, as being not smaller than the value reached by the expression recited in the claim. Moreover, the specification specifically discusses this distance and the expression at page 23, lines 1-8, for example. Thus, this rejection should be withdrawn.

The Examiner indicates that claim 4 is rejected under 35 U.S.C. § 112, second paragraph, but would be allowable if rewritten to overcome the rejection. Applicant notes that claim 8


should be patentable for at least the same reasons as claim 4, by virtue of its dependency therefrom.

Claims 1-3 and 5-8 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-31 of USP 6,199,995 B1 and 1-8 of USP 6,196,692 B1.

Analysis

Of the rejected claims, claim 1 is the only claim in independent form; therefore, the following discussion is initially directed to this independent claim.

Claim 1 is directed to a plane light source unit where light incident on a lower surface of a light pipe is transmitted and made visible through an upper surface of the light pipe. A linear light source is disposed on the incidence side surface of the light pipe. The linear light source has an effective light emission region which is longer than a longitudinal length of the incidence side surface.

 Applicant respectfully submits that '995 and '692 both fail to claim a linear light source having an effective light emission region which is longer than a longitudinal direction of the incidence side surface. Applicant submits that this feature is patentably distinguishable from '995 and '692.

In view of the foregoing, Applicant respectfully requests the Examiner to reconsider and withdraw the prior art rejection of claim 1.

The remaining rejections are directed to the dependent claims. These claims should be patentable for at least the same reasons as claim 1, by virtue of their dependency therefrom.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/695,306

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ellen R. Smith", written over a horizontal line.

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 2, paragraph 2:

In consideration of the above description, the inventor of the present invention produced a plane light source unit which can suppress production of scattered light, and tried [prevention of] to prevent shortage of contrast and disorder of the display by applying the plane light source unit to a front-lighting system. In this case, however, a difference between brightness and darkness occurred in the plane light source because a luminance leveling effect owing to scattering of light was lost. Hence, it was found that dark portions were formed to cause a problem of [partial] missing portions in a display image.

Page 7, paragraph 1:

The repetitive structure of irregularities may be constituted by convex or concave portions each having equal side surfaces. However, from the point of view of light utilizing efficiency, and from the point of view that the light which has exited from the lower surface is turned over by the reflection layer to exit from the upper surface in a frontal (perpendicular) direction with good directivity, it is particularly preferable that the repetitive structure of the light output means (illustrated as reference 14 in Fig. 2) is constituted by prism-like irregularities each constituted by a combination of a short side surface 11a1 (θ_1) inclined down from the incidence

side surface 11c toward the counter end surface 11d at an inclination angle in a range of from 30 to 45 degrees with respect to the reference plane 11e parallel with the lower surface 11b, and a long side surface 11a2 (θ_2) with an inclination angle in a range of from 0 to 10 degrees as shown in Fig. 2. Incidentally, discrimination between convex portions and concave portions is based on a line connecting the short side surfaces and the long side surfaces to a plane for formation thereof. That is, discrimination between convex portions and concave portions is made by the fact as to whether the points (vertices) of intersection between the short side surfaces and the long side surfaces are protruded (convex) from the line or depressed (concave) from the line.

Page 28, paragraph 1:

[A] Any suitable material can be used as the polarizer. A material high in the degree of polarization such as an absorption type linear polarizer of iodine or dye can be used preferably from the point of view of obtaining good-contrast display owing to incidence of high-grade linearly polarized light, etc. Incidentally, when the reflection type liquid-crystal display device is formed, a suitable optical device such as a diffusing layer, a protective layer or a compensatory retarder plate can be arranged suitably. In this case, a material exhibiting [so] a weak diffusing characteristic so that the display image is not disordered can be used as the diffusing layer.

Page 30, paragraph 2:

A mold₁ in which a mold core having a surface cut into a predetermined shape by a diamond bit was mounted₁ was heated to 80°C and filled with molten polymethyl methacrylate

heated at 260°C. Thus, a light pipe was obtained. The light pipe had a width of 40 mm and a depth of 25 mm. The light pipe had an incidence side surface having a thickness of 1 mm, and a counter end having a thickness of 0.6 mm. The light pipe had flat upper and lower surfaces. The light pipe had prism-like irregularities in the upper surface. The prism-like irregularities ($\theta=0$) were disposed at a pitch of 210 μm so as to be parallel with the incidence side surface. The prism-like irregularities had short surfaces, and long side surfaces. The inclination angles of the short side surfaces changed in a range of from 42.5 to 43 degrees. The inclination angles of the long side surfaces changed in a range of from 1.8 to 3.5 degrees. The inclination angle difference between adjacent long side surfaces was not larger than 0.1 degrees. The projected width of each short side surface on the lower surface was in a range of from 10 to 16 μm . The ratio of the projected area of the long side surfaces on the lower surface to the projected area of the short side surfaces on the lower surface was not smaller than 12. Incidentally, the prism-like irregularities were formed to start from a position [far by] 2 mm from the incidence side surface.

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A plane light source unit comprising:

a light pipe including an upper surface, a lower surface, and an incidence side surface, and including a light output means formed in said upper surface so that light incident on said incidence side surface exists from said lower surface through said light output means while light incident on said lower surface is transmitted through said upper surface; and

a linear light source disposed on said incidence side surface of said light pipe, said linear light source having an effective light emission region which is longer than a longitudinal length of said incidence side surface,

whereby [information] said light [generated] incident on the lower surface of said light pipe is transmitted and made visible through the upper surface of said light pipe.

2. (Amended) A plane light source unit according to claim 1, wherein:

said light output means of said light pipe has a repetitive structure of prism-like irregularities arranged at intervals of a pitch in a range of from 50 μm to 1.0 mm, each of said prism-like irregularities being constituted by a combination of a short side surface and a long side surface;

said short side surface is made of a slope inclined down from said incidence side surface toward an end side opposite to said incidence side surface at an inclination angle in a range of from 30 to 45 degrees with respect to a reference plane of said lower surface; and

said long side surface is made of a slope having an inclination angle in a range of from 0 to 10 degrees with respect to said reference plane, so that a difference between the inclination angles [being] is not larger than 5 degrees as a whole, the difference between the inclination angles of adjacent long side surfaces is not larger than 1 degree, and a projected area of said long side surface on said reference plane is not smaller than five times as large as that of said short side surface.

4. (Amended) A plane light source unit according to claim 3, wherein each [of ends] end of said effective light emission region of said linear light source [is protruded] protrudes by a distance not smaller than a value calculated by an expression: $1 \text{ mm} + d \cdot \sin\theta + d/2$, from a corresponding end surface of said light pipe [on the basis of] corresponding to a side in which said ridgeline of said prism-like irregularities of said light pipe drifts apart from said linear light source, [when]

wherein θ is an inclination angle of said ridgeline of said prism-like irregularities with respect to said incidence side surface, and

d is a distance between said incidence side surface and a front end surface of said linear light source.